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nationality arising partly from general intermarriage and partly from equal laws. But the conflict of races has ceased only in a transformation into a conflict of classes, an economic conflict of workers and capitalists,—a conflict of so very real and stern a character as to make Professor Fiamingo's talk of "the *pretended* Conflict of Classes" almost amusing. This conflict has still to run its course; but in the future we may foresee yet another transformation of the social conflict,—a conflict not of different races and classes in fierce opposition, but of different aptitudes in voluntary co-operation, in their due spheres, for the common good,—a sociological analogous to the biological, conflict of anabolic and katabolic energies in the metabolism of a healthy organism.

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### ANIMAL AUTOMATISM AND CONSCIOUSNESS.

The interest of Prof. Lloyd Morgan's October article lies mainly in its deterministic significance. Some want of clearness, noticeable here and there, is caused by uncertainty as to the precise sense in which the late Professor Huxley used the ambiguous term "automata," and by a rather intricate effort to decide this, and to reach a better definition.

The word "automatic" "has received," says Dr. Augustus Waller, "two diametrically opposed meanings, viz, (1) Self-moving, self-arising, spontaneous, in "literal translation of *αὐτόματος*; (2) automaton-like, that is to say, like a mechanism that appears to be self-moving, but that we know to be moved by secret "springs and hidden keys."<sup>1</sup> Professor Huxley seems to have used "automata" in the second of these senses, as a compact synonym for "machines which appear to be, but are not, self-moving." Professor Morgan, however, thinks that it may be "fairly inferred from what is explicitly or implicitly contained" in Professor Huxley's essay that he used the term as "applicable to any mechanism all the workings of which at any given time are explicable in terms of physical causation." He then objects to this "inferred" definition because, he thinks, it is not in accordance with general usage, not helpful in the study of animal life, and does not preserve the spirit of Descartes's teaching. And he proposes (p. 8) this "more restricted" definition: "Automatic action is that which is performed without the "immediate and effective intervention of those molecular changes in the cerebral "cortex which are accompanied by consciousness (such intervention being rendered "possible by association)."

The root of the matter seems to lie not in the subsidiary inquiry, How should "automata" be defined? but in the much deeper question, Does volition cause and control "voluntary" acts?

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<sup>1</sup> *Human Physiology*, third edition, p. 293.

Professor Huxley's opinion that it does not, appears to have been based on his conception of volition as being, like other states of consciousness, and sensations generally, an "immaterial entity," without any attributes in common with the attributes ascribed to matter, impervious to any contact with material particles, and, consequently, unable to be impressed by, or to impress, matter in motion. "The 'sense organ,' he says,<sup>1</sup> 'stands as a firm and impervious barrier through which 'no material particle of the world without can make its way to the world within.' 'With the sensorium, matter and motion come to an end; while phenomena of 'another order, or immaterial states of consciousness, make their appearance. 'How is the relation between the material and the immaterial to be conceived: 'This is the metaphysical problem of problems.'"<sup>2</sup>

These considerations led him to suggest, in 1874, that the difficulty in imagining "that volition, which is a state of consciousness, and, as such, has not the 'slightest community of nature with matter in motion, can act upon the moving 'matter of which the body is composed, as it is assumed to do in voluntary 'acts,' is to be met by the supposition that voluntary acts are as purely mechanical as other actions, 'and are simply accompanied by the state of consciousness called volition . . . volitions do not enter into the chain of causation . . . at all.'"<sup>3</sup>

In 1870 he had expressed the opposite view that a voluntary act primarily requires a distinct consciousness and volition of its details. "Our voluntary acts consist of two parts: firstly, we desire to perform a certain action, and, secondly, 'we somehow set a-going a machinery which does what we desire. But so little 'do we directly influence that machinery, that nine-tenths of us do not even know 'of its existence. . . . We desire the utterance of certain words: we touch the 'spring of the word machine, and they are spoken. Just as Descartes's engineer, 'when he wanted a particular hydraulic machine to play, had only to turn a tap, 'and what he wished was done. . . . If the act which primarily requires a distinct 'consciousness and volition of its details, always needed the same effort, education would be an impossibility.'"<sup>4</sup>

The explanation of this inconsistency is to be found, probably, in the instability of Professor Huxley's intellectual attitude towards the "problem of problems." He seems to have felt under no obligation to form a final opinion about it, and when, sometimes, it seemed necessary to indicate a preference for one or other of the various conflicting solutions, his choice was more or less qualified and provisional. When, in 1870, he held that an act "primarily," i. e., until it has become, by repetition, mechanical, "requires a distinct consciousness and volition of its details, he evidently did not regard volition as an immaterial entity, unable to impress, or be impressed by, moving matter. When, however, he stated, in 1874, that volitions do not enter into the chain of causation of voluntary acts at all, he was under the influence of that dualistic conception. For at that time he thought

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<sup>1</sup> *Collected Essays*, VI., p. 299.    <sup>2</sup> *Ibid.*, VI., p. 304.    <sup>3</sup> *Ibid.*, I., 241.    <sup>4</sup> *Ibid.*, I., pp. 187, 188.

that "of two alternatives," the dualistic and materialistic, "one must be true. "Either consciousness is a function of something distinct from the brain, which we call the soul, and a sensation is the mode in which this soul is affected by the mode of motion of a part of the brain, or there is no soul, and a sensation is something generated by the mode of motion of a part of the brain. In the former case the phenomena of the senses are purely spiritual affections, in the latter they are something manufactured by the mechanism of the body."<sup>1</sup> Of these alternatives he at this time (1874) accepted the dualistic, since he was "utterly incapable of conceiving the existence of matter if there is no mind in which to picture that existence."<sup>2</sup>

In 1879 he remarked about these two speculations, and a third,— "that the sensation is, neither directly nor indirectly, an effect of the mode of motion of the sensorium, but that it has an independent cause,"—that neither of them "can be regarded as anything but a more or less convenient working hypothesis." "But," he added, "if I must choose between them, I take the 'law of parsimony' for my guide, and select the simplest, namely, that the sensation is the direct effect of the mode of motion of the sensorium."<sup>3</sup> "In ultimate analysis, then, it appears that a sensation is the equivalent in terms of consciousness for a mode of motion of the matter of the sensorium."<sup>4</sup> This conclusion, whether materialistic or monistic, is in marked contrast with the strongly expressed dualistic preference in 1874.

In 1886 he repudiated, "as philosophic error, the doctrine of materialism," as he understood it, heartily disbelieving its main tenet "that there is nothing in the universe but matter and force," and holding "that there is a third thing . . . to-wit, consciousness," which he could not see "to be matter or force, or any conceivable modification of either."<sup>5</sup> "If," he at this time wrote, "I were forced to choose between materialism and idealism, I should elect for the latter; and I certainly would have nothing to do with the effete mythology of spiritualism. But I am not aware that I am under any compulsion to choose either the one or the other."<sup>6</sup>

In 1894 he seems to have inclined once more to the materialistic solution. For in a note of that year on Descartes's view that animals are non-sentient mechanism, but that the human soul, "which alone feels and thinks, is extra-natural—a something divinely created and added to the anthropoid mechanism," he remarked: "Descartes's denial of sensation to the lower animals is a necessary consequence of his hypothesis concerning the nature and origin of the soul. He was too logical a thinker not to be aware that, if he admitted even the most elementary form of consciousness to be a product or a necessary concomitant of material mechanism, the assumption of the existence of a thinking substance, apart from matter, would become superfluous."<sup>7</sup>

But Professor Huxley himself went far beyond the mere making of this admis-

<sup>1</sup> *Ibid.*, I., p. 210.

<sup>2</sup> *Ibid.*, I., p. 245.

<sup>3</sup> *Ibid.*, VI., p. 306.

<sup>4</sup> *Ibid.*, VI., p. 317.

<sup>5</sup> *Ibid.*, IX., pp. 128, 129, 130.

<sup>6</sup> *Ibid.*, IX., p. 133.

<sup>7</sup> *Ibid.*, VI., p. 246.

sion. He definitely pronounced that "there is no doubt that a molecular change in some parts of the cerebral substance, is an indispensable antecedent to every phenomenon of consciousness."<sup>1</sup> That is to say, he accepted as scientifically established a process in the genesis of consciousness which, by his own showing, makes the dualistic "assumption of the existence of a thinking substance apart from matter,"—a thinking "immaterial entity,"—superfluous, and therefore, by "the law of parsimony," inadmissible. The greater includes the less, and the blow thus dealt by him to his own occasional support of the dualistic hypothesis is equally destructive to his conception of volition as unable to impress moving matter because, being an immaterial entity, it has "not the slightest community of nature" with it.

It does not, however, follow, from the unsoundness of the particular grounds on which Professor Huxley based his conclusion, that the conclusion itself is inadmissible. Before it can be safely maintained that he was wrong in holding that volition is only "an emotion indicative of physical changes, not a cause of such changes,"<sup>2</sup> it must be shown that Professor Ziehen is in error when he says that "that which we call will, on strict analysis, is reduced essentially to the tension accompanying the association of ideas<sup>3</sup> and the action"; that "motor ideas,"<sup>4</sup> produced by the association of ideas, are themselves able to produce "motor innervation";<sup>4</sup> and that that which finally causes the idea of a movement which is accompanied "by the stronger tone of feeling" to prevail, and suppresses the idea of not performing that movement, or of performing others, "is not a special faculty exercising free will, but only the stronger emotional tone and greater associative affinity of the prevailing idea, combined with the favorable grouping of the latent mental images. Our actions are as strictly necessitated as our thoughts."<sup>5</sup>

In opposition to these opinions Prof. Lloyd Morgan appears to regard volition as a special faculty, exercised by the cerebral cortex, and causing and controlling "voluntary" action. "The cerebral cortex is," he thinks, "the organ of control . . . in its own right." It is "not the instrument of that which controls, but *is*, from the physical point of view, that which controls." (P. 7.) He draws a distinction in kind, where modern physiology appears to recognise only a distinction in degree, between the "co-ordination which is seen in reflex action and in instinctive response," and that "which is seen in voluntary action and renders acquisition possible." (P. 11.) Of this higher type of co-ordination he says: "It exercises a more or less modifying influence on instinctive responses, and thus lifts them above the level of automatism. It involves the direct intervention of those molecular cortical processes which have for their conscious concomitants

<sup>1</sup> *Lessons in Elementary Physiology*. 1885. P. 300.

<sup>2</sup> *Ibid.*, I., 240.

<sup>3</sup> *Introduction to Physiological Psychology*, translated by Drs. Van Liew and Beyer. Second edition, p. 28.

<sup>4</sup> *Ibid.*, p. 275.    <sup>5</sup> *Ibid.*, pp. 296, 297.

"what we term 'choice' based on previous individual experience and dependent upon the association of impressions and ideas." (P. 11.) "On this conscious selection and choice depends . . . the whole of mental as contrasted with merely biological evolution. On it, too, depends the distinction between animal automatism, in the restricted sense here advocated, and those higher powers which, though founded thereon, constitute a new field of evolutionary progress." (P. 18.)

But these lower and higher "types" of "regulative co-ordination," in the view of eminent physiologists of the day, are the workings of lower and higher grades of automatism. "All these facts," says Prof. Michael Foster, (with reference to the spontaneous movements of frogs and pigeons after removal of their cerebral hemispheres), "seem to point to the conclusion that what may be called mechanical spontaneity, sometimes spoken of as 'automatism,' differs from the spontaneity of the 'will,' in degree rather than in kind. Looking at the matter from a purely physiological point of view, . . . the real difference between an automatic act and a voluntary act is that the chain of physiological events between the act and its physiological cause, is in the one case short and simple in the other long and complex."<sup>1</sup> "The difference," says Professor Ferrier, distinguishing between impulsive and deliberate actions, "is not in kind, but only in degree of complexity; for in the end actions conditioned by the resultant of a complex system of associations are of essentially the same character as those conditioned by the simple stimulus of a present feeling or desire, where no other associations have as yet been formed capable of modifying it."<sup>2</sup> So, also, Dr. Augustus Waller remarks: "Objectively viewed in the conduct of living beings as it unfolds itself before us voluntary action appears as a highly disguised and complicated form of reflex action, with its causal excitations more or less concealed, more or less deeply buried in the past history of the individual or of the ancestors."<sup>3</sup> And: "If the doctrine of spontaneous volition be accepted (an admission which seems to entail acceptance of the view that effects may occur without causes, or phenomena without generators) the voluntary act commences at the cortical motor cell. But it is more logical to admit that previous sensations have been registered, and that volition is a resultant of past as well as of present sensations."<sup>4</sup>

Analyse "what we term 'choice'" and it is seen to be the inevitable victory of the strongest among conflicting motives. Where such conflict exists, "action," says Professor Ferrier, "is conditioned by the stronger."<sup>5</sup> No one has stated this more plainly, though not altogether accurately, than Prof. Lloyd Morgan himself. "Volition," he says, "is the faculty of the forked way. There are two possibilities, fulfilment in action, or inhibition. I can write or I can cease writing; I can strike or I can forbear. . . . For volition involves an antagonism of motives, one

<sup>1</sup> *Text-book of Physiology*, fifth edition, p. 1004.

<sup>2</sup> *Functions of the Brain*, second edition, p. 440.

<sup>3</sup> *Human Physiology*, third edition, p. 296.    <sup>4</sup> *Ibid.*, p. 297.    <sup>5</sup> *Functions of the Brain*, p. 439.

"or more prompting to action, one or more prompting to restraint. The organism "yields to the strongest prompting, acts or refrains from acting according as one "motive or set of motives prevails; in other words, according as the stimuli to "action or the inhibitory stimuli are the more powerful."<sup>1</sup>

But if the organism yields to "the strongest prompting," and action is determined by it, "choice," in the ordinary sense, disappears. Of Professor Morgan's "two possibilities" one only, the following of the strongest impulse, can exist. The cerebral cortex cannot be the organ of control "in its own right," but must be merely "the instrument of that which controls." It, equally with "the lower brain centres which are concerned with automatism in the more restricted sense," is seen to be itself controlled, since "the actions which we term voluntary," and are "the effects of those molecular changes in the cortex which are accompanied by consciousness," are conditioned and determined, not by independent working of the cortex, but by the strongest of the various stimuli which cause molecular changes in its substance.

Either, then, it seems, Prof. Lloyd Morgan must give up his present belief that "the organism yields to the strongest prompting" or his conclusion that actions, whether of animals or men, cease to be automatic, that is, mechanical and "determined," when they are the result of "conscious selection and choice." So long as he retains his belief in the victory of "the strongest prompting," it seems impossible to distinguish logically, between his determinism and that of Professor Huxley and the Editor. He has already expressed a view<sup>2</sup> similar to theirs,<sup>3</sup> as to the way by which a reconciliation—(hollow, as I venture to think, and unreal)—may be brought about between determinism and "freedom."

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<sup>1</sup> *Animal Life and Intelligence*, p. 459.

<sup>2</sup> *Introduction to Comparative Psychology*, p. 340.

<sup>3</sup> *Collected Essays*, I., pp. 240, 244; VI., p. 220; IX., p. 141. *The Monist*, III., p. 87, "The Idea of Necessity."